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Thermodynamic stability study of native and modified mushroom tyrosinase

Nematollah Gheibi[1], Sayid Emami[2]

1) Department of Biophysics and Biotechnology, Qazvin University of Medical Sciences, Qazvin, Iran
2) Department of Biophysics, Islamic Azad University, Science and Research Branch, Tehran, Iran

ABSTRACT

Mushroom Tyrosinase (MT) is a copper-containing enzyme, which is widely distributed in microorganisms, animals and plants. It is also a key enzyme in melanin biosynthesis, which plays a crucial role in determining the color of mammalian skin and hair. Nowadays melanoma is the one of the most terrified and lethal cancers. In this work, the modification of tyrosinase by Woodward's reagent k has been done and its thermodynamic stability was investigated. For the study of stability, thermodynamic parameters obtained from thermal and chemical denaturation of the native and modified enzyme. T_m values in thermal denaturation showed thermal instability for modified enzyme. T_m values for the native and modified enzyme with different concentrations of the modifier (0.5, 1, 5 and 10 mM) were determined 61.2, 60.1, 58.3, 53.9 and 45.5 (^{0}C) respectively. In chemical denaturation 8 M Guanidium Hydrochloride was used. The C_m (half of modifier's concentration) and ΔG_{H2O} (free energy) values for the native and modified enzyme were obtained. The values of ΔG_{H2O} for the native and modified enzymes were 17.22, 16.75, 15.0, 13.7 and 11.5 KJ/mol and the values of C_m are 8.0, 7.5, 6.7, 10.0 and 8.0 (M) respectively. Thus, decreasing in values of ΔG_{H2O} for the modified enzyme in comparison with its native form indicate the protein instability.

Key words: Tyrosinase; Woodward reagent k; Modification; Thermodynamic; Stability